

Relativity as a Pressure Phenomenon in the Quarkic Ether

“And Ether Said: Let There Be Relativity”

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Abstract

Classical relativity explains the invariance of the speed of light by postulating a geometric structure of spacetime without physical support. In contrast, the Quarkbase Cosmology restores the notion of a perfect-pressure medium—the etheric plasma—as the physical substrate from which all relativistic effects emerge. By analysing the motion of a compact quarkbase through this frictionless medium, it is shown that the same Lorentz factor

$$\gamma_{\Psi} = \frac{1}{\sqrt{1 - (v/c_{\Psi})^2}}$$

arises naturally from the finite propagation velocity of pressure waves (c_{Ψ}). Time dilation, length contraction, and the energy–momentum relations are reinterpreted as hydrodynamic consequences of the delayed restoration of pressure behind a moving source. Gravitational curvature appears as a gradient of the local propagation index $n_{\Psi}(\mathbf{x})$, and all relativistic and optical phenomena—Doppler shift, aberration, Shapiro delay, lensing, and cosmological redshift—are reproduced by variations of the pressure field $\Psi(x, t)$ within a non-dissipative medium ($\mu = 0$). Thus, relativity is recovered not as a geometric postulate, but as a macroscopic manifestation of the coherent dynamics of an underlying etheric continuum.

1 The Return of the Ether: When Relativity Emerges from the Quarkic Vacuum

For more than a century, the word *ether* has been banished from physics. Einstein discarded it because it seemed unnecessary: the equations of relativity appeared sufficient. However, the **Quarkbase Cosmology** revives the concept from a different perspective: the ether is neither an archaic gas nor a mystical substance, but a **perfect-pressure plasma** that permeates the entire universe and from which forces, particles, and even spacetime itself emerge.

Most remarkably, when analysing how an object moves within this medium, **relativity reappears spontaneously**.

2 A Velocity Limit in the Ether

The ether possesses a maximum speed at which its pressure waves can propagate, denoted by c_{Ψ} . No quarkbase—the fundamental particle of the model—can move faster than this. As the velocity approaches this limit, the pressure front becomes compressed and the wake behind it elongates; the medium cannot “refill” the displaced volume in time.

The outcome is that the effort required to keep accelerating grows without bound. It is the same barrier imposed by light in Einstein’s relativity, but here it **arises from the intrinsic behaviour of the ether itself**.

$$\mathcal{L} = \frac{1}{2} \partial_{\mu} \Psi \partial^{\mu} \Psi - \frac{1}{2} \mu^2 \Psi^2 - J \Psi, \quad \frac{1}{c_{\Psi}^2} \ddot{\Psi} - \nabla^2 \Psi + \mu^2 \Psi = -J.$$

For a point-like source moving at constant velocity ($v < c_{\Psi}$):

$$J(t, \mathbf{x}) = \alpha \delta^{(3)}(\mathbf{x} - \mathbf{v}t),$$

the pressure field it generates cannot reorganize instantaneously; the ether requires a finite time to “close” the displaced volume.

3 The Same Lorentz Factor from a Different Origin

From this **medium delay** arises the relativistic factor of the ether:

$$\gamma_{\Psi}(v) = \frac{1}{\sqrt{1 - (v/c_{\Psi})^2}}.$$

This term does not stem from an abstract geometry but from the **physical cost of dragging the ether**. The higher the velocity of the quarkbase, the longer the medium takes to recover and the greater the displaced volume.

At the characteristic scale λ (the typical range of the pressure field), the recovery time is:

$$\tau_{\text{rec}} = \frac{\lambda}{c_{\Psi} - v} = \frac{\lambda/c_{\Psi}}{1 - v/c_{\Psi}} \approx \frac{\lambda}{c_{\Psi}} \gamma_{\Psi}^2 (1 + \beta_{\Psi}), \quad \beta_{\Psi} = \frac{v}{c_{\Psi}}.$$

And the length of the generated wake:

$$L(v) = v \tau_{\text{rec}} \propto \gamma_{\Psi} \lambda.$$

Thus, the faster the quarkbase moves, the longer the “trail” of displaced volume left behind it becomes, and the more concentrated the compression in front.

In energetic terms, the increase in γ_{Ψ} means that **the field accumulates energy due to the unrecovered displacement of the ether**, in the same way that a relativistic object accumulates kinetic energy through its motion.

4 Compression Energy, Not Mass

The rest energy of a quarkbase does not arise from mass, but from the **minimum pressure required to keep it stable within the ether**. That fundamental energy is:

$$E_0 = P_0 V_q c_{\Psi}^2,$$

where P_0 represents the **internal compression coefficient** and V_q the effective volume of the quarkbase. The product $P_0 V_q$ defines a **quarkic compression constant**, analogous to the parameter m_0 in relativity, but of a purely volumetric nature.

The associated pressure field has an energy density given by the energy–momentum tensor:

$$T^{\mu\nu} = \partial^{\mu}\Psi \partial^{\nu}\Psi - \eta^{\mu\nu} \mathcal{L},$$

so that the total energy of the system is

$$E = \int d^3x T^{00} = \int d^3x \left[\frac{1}{2c_{\Psi}^2} (\partial_t \Psi)^2 + \frac{1}{2} ((\nabla \Psi)^2 + \mu^2 \Psi^2) \right].$$

For the stationary state, the energy remains at E_0 . When the quarkbase moves, the volume of compressed ether increases in proportion to γ_Ψ , and the field acquires additional energy due to the frontal compression and the delayed wake:

$$E = \gamma_\Psi E_0 = \gamma_\Psi P_0 V_q c_\Psi^2.$$

The observed inertia is not an intrinsic property of the quarkbase, but rather **the reaction of the displaced ether resisting a faster deformation**. Accelerating it implies modifying the coherent pressure field of the surrounding medium, which raises the required energy by the same factor γ_Ψ .

5 Time Dilates Because the Medium Lags

When a quarkbase moves, the ether requires a finite time to return to its equilibrium state behind it. This **delayed recovery of the medium** not only creates a physical wake but also slows down all internal processes associated with the vibration of the pressure field.

If the quarkbase is at rest, the field oscillations are symmetric in both time and space. However, when it moves, the rear part of the field remains in a recovery phase while the front is already being compressed. The result is that the **internal rate becomes dilated** in the same proportion as the medium's delay.

Mathematically, the motion is described by a coordinate transformation of the form:

$$t' = \gamma_\Psi \left(t - \frac{v}{c_\Psi^2} x \right), \quad x' = \gamma_\Psi (x - vt),$$

with

$$\gamma_\Psi = \frac{1}{\sqrt{1 - (v/c_\Psi)^2}}.$$

From these relations, one obtains the correspondence between proper time and the observer's time:

$$d\tau^2 = dt^2 \left(1 - \frac{v^2}{c_\Psi^2} \right), \quad \Rightarrow \quad d\tau = \frac{dt}{\gamma_\Psi}.$$

This means that the physical processes associated with the quarkbase—such as the oscillations of the Ψ field in its immediate surroundings—evolve more slowly for an external observer. Here, **time dilation** is not a geometric consequence but a **phase effect**: the ether cannot transmit the recovery of pressure faster than c_Ψ , so each internal oscillation becomes “spaced out” in time.

Likewise, **length contraction** is interpreted as a compression of the pressure front:

$$L_{\parallel} = \frac{L_0}{\gamma_\Psi(v)}.$$

The compressed front and elongated wake are not optical illusions but direct manifestations of the real delay of the ether.

In summary, the relativity of time and length does not emerge from an abstract geometry but from the **same dynamic behaviour of the quarkic medium** that imposes a natural limit on the propagation speed of any perturbation.

6 Velocity Addition and the Absolute Barrier

In the dynamics of the quarkic ether, velocities do not add linearly. When a quarkbase moves within an ether flow that already possesses its own velocity, the effective combination is governed by the same rule as in classical relativity, but with c_Ψ as the structural limit of the medium:

$$w = \frac{u + v}{1 + \frac{uv}{c_\Psi^2}}.$$

This result is not arbitrary. It arises from the composition of two successive deformations of the pressure field Ψ : one generated by the quarkbase's own motion and another by the flow of the surrounding ether. They do not add directly because the **longitudinal compression of the medium** changes the temporal and spatial scale of each perturbation.

The limit appears naturally. When the velocity of the quarkbase approaches the propagation speed of the field:

$$\lim_{v \rightarrow c_\Psi^-} \gamma_\Psi(v) = \infty,$$

the volume of ether displaced at the front tends to infinity:

$$\Delta V(v) = \Delta V_0 \gamma_\Psi(v).$$

Physically, this means that **there is no medium left to compress**. The pressure front accumulates without being able to propagate, and any attempt to increase the velocity requires an enormous amount of energy. There is no friction to stop it (the ether satisfies $\mu = 0$), but the very geometry of the displacement makes further acceleration impossible.

From this it follows that c_Ψ is the **absolute kinematic limit of the etheric universe**: the maximum velocity at which information or deformations of the Ψ field can propagate.

7 Radiation, Doppler, and Etheric Light

A source that vibrates or moves within the ether generates waves of the Ψ field. When at rest, these waves expand symmetrically; but if the source moves, the compression of the front and the delay in the wake produce **a directional deformation of the radiation**.

Mathematically, the frequency observed by a detector at rest with respect to the medium is obtained through the etheric Doppler relation:

$$\omega' = \gamma_\Psi \omega (1 - \beta_\Psi \cos \theta), \quad \beta_\Psi = \frac{v}{c_\Psi}.$$

Here ω is the proper frequency of the pressure vibration, and θ the angle between the direction of motion and the line of observation.

This frequency shift does not arise from a change in absolute time, but from the **delayed phase of the Ψ field**: the compressed front emits waves that are closer together,

while the wake emits them farther apart. The result is identical to the relativistic prediction of the optical Doppler effect but has a distinct physical foundation: **the delay of the ether**.

The same principle produces the **angular aberration** of radiation. The waves in the front become concentrated into an increasingly narrow cone as the velocity rises:

$$\cos \theta' = \frac{\cos \theta - \beta_\Psi}{1 - \beta_\Psi \cos \theta}.$$

When v approaches c_Ψ , the emission angle tends to align with the direction of motion, concentrating the field energy into an increasingly smaller region.

This angular compression represents a genuine “etheric light”: the pressure waves of the Ψ field exhibit **all the properties of electromagnetic radiation** (frequency, wavelength, Doppler effect, aberration), but their origin does not lie in electrical oscillations—it resides in **pressure vibrations of the quarkic plasma**.

In this formulation, light and any form of radiation are phenomena of the same nature as a perfect acoustic wave in a frictionless medium. The difference is that their limiting velocity c_Ψ is the highest possible and defines the metric structure of the universe.

8 Gravity as a Pressure Gradient

Within the quarkic framework, what we call “gravity” is the spatial variation of the ether’s **pressure index**. This variation rescales the local propagation speed of the field and defines an **effective metric** for both trajectories and waves.

8.1 Local Velocity, Index, and Eikonal

Let the local velocity of the medium be

$$c_\Psi(\mathbf{x}) = c_\Psi^{(\infty)}(1 - \xi \Phi_\Psi(\mathbf{x})), \quad |\xi \Phi_\Psi| \ll 1,$$

and the etheric index

$$n_\Psi(\mathbf{x}) \equiv \frac{c_\Psi^{(\infty)}}{c_\Psi(\mathbf{x})} \simeq 1 + \xi \Phi_\Psi(\mathbf{x}).$$

Here, Φ_Ψ is the **pressure potential** induced by sources and deformations of the Ψ field.

In the eikonal approximation, the waves obey the principle of stationary phase:

$$\delta \int n_\Psi(\mathbf{x}) dl = 0,$$

which gives rise to ray curvature, delay, and etheric lensing.

8.2 Effective Metric (Weak and Isotropic Regime)

The dynamics of particles and waves can be rewritten in an effective metric:

$$ds^2 = g_{\mu\nu}^{\text{eff}} dx^\mu dx^\nu, \quad g_{00}^{\text{eff}} \simeq 1 + 2\phi_\Psi, \quad g_{ij}^{\text{eff}} \simeq -(1 - 2\phi_\Psi) \delta_{ij},$$

with

$$\phi_\Psi(\mathbf{x}) \equiv \frac{1}{2}(n_\Psi^2 - 1) \simeq \xi \Phi_\Psi(\mathbf{x}).$$

In this metric, the conservation law $\nabla_\mu T^{\mu\nu} = 0$ determines the trajectories (geodesics) of quarkbases and wave fronts.

8.3 Pressure Potential Equation

The potential that deforms the index arises from the Ψ field. In the quasistatic and linear regime:

$$(\nabla^2 - \lambda^{-2}) \Phi_\Psi(\mathbf{x}) = -\kappa \rho_{\text{src}}(\mathbf{x}),$$

where λ is the range (of Yukawa type), and ρ_{src} represents the **ether displacement density** generated by the sources/localizers of the Ψ field. For point-like distributions:

$$\rho_{\text{src}}(\mathbf{x}) = \sum_a \alpha_a \delta^{(3)}(\mathbf{x} - \mathbf{x}_a).$$

8.4 Nonrelativistic Limit: “Gravitational” Acceleration

For small velocities compared with c_Ψ , the geodesic equation yields

$$\frac{d^2 \mathbf{x}}{dt^2} \simeq -\nabla \phi_\Psi(\mathbf{x}),$$

that is, the acceleration is the **gradient of the effective pressure potential**. There is no “mass” involved, only the response of the medium.

8.5 Observable Signals

a) Delay (Ethereic Shapiro Effect). A ray passing through a region with $n_\Psi > 1$ accumulates a delay:

$$\Delta t \simeq \frac{1}{c_\Psi^{(\infty)}} \int (n_\Psi(\mathbf{x}) - 1) dl \simeq \frac{\xi}{c_\Psi^{(\infty)}} \int \Phi_\Psi(\mathbf{x}) dl.$$

b) Angular Deflection (Ethereic Lens). For an approximately cylindrical profile:

$$\hat{\alpha} \simeq \int \nabla_\perp n_\Psi(\mathbf{x}) \frac{dl}{n_\Psi(\infty)} \simeq \xi \int \nabla_\perp \Phi_\Psi(\mathbf{x}) dl.$$

c) Gravitational Frequency Shift. For two levels at different heights of ϕ_Ψ :

$$\frac{\Delta \omega}{\omega} \simeq \phi_\Psi(\mathbf{x}_{\text{em}}) - \phi_\Psi(\mathbf{x}_{\text{obs}}) \simeq \xi [\Phi_\Psi(\mathbf{x}_{\text{em}}) - \Phi_\Psi(\mathbf{x}_{\text{obs}})].$$

d) Temporal Redshift (Cosmological Scenario). If the index varies with time on a large scale:

$$1 + z = \frac{n_\Psi(t_{\text{obs}})}{n_\Psi(t_{\text{em}})} \simeq 1 + \xi [\Phi_\Psi(t_{\text{obs}}) - \Phi_\Psi(t_{\text{em}})].$$

8.6 Compatibility with the Relativistic Limit of the Ether

Local clocks satisfy

$$d\tau^2 = g_{00}^{\text{eff}} dt^2 - g_{ij}^{\text{eff}} dx^i dx^j / c_\Psi^{(\infty)2}, \quad d\tau \simeq (1 + \phi_\Psi) dt \quad (\text{local rest frame}).$$

The same mathematical forms of relativity emerge here because the **propagation limited by** c_Ψ and the **spatial variation of** $c_\Psi(\mathbf{x})$ generate an effective metric that governs both particles and waves.

9 Two Theories, One Same Form

After the entire development, the correspondence between classical relativity and the etheric relativity of the Ψ field turns out to be exact in form, although completely different in physical meaning. The equations are preserved, but the symbols change their physical nature.

Physical Concept	Classical Relativity	Quarkic Ether Relativity
Limiting velocity	c (speed of light)	c_Ψ (propagation speed of pressure)
Relativity factor	$\gamma = \frac{1}{\sqrt{1 - (v/c)^2}}$	$\gamma_\Psi = \frac{1}{\sqrt{1 - (v/c_\Psi)^2}}$
Rest energy	$E_0 = mc^2$	$E_0 = P_0 V_q c_\Psi^2$ (minimum compression energy)
Energy in motion	$E = \gamma mc^2$	$E = \gamma_\Psi P_0 V_q c_\Psi^2$
Energy-momentum relation	$E^2 = p^2 c^2 + m^2 c^4$	$E^2 = p^2 c_\Psi^2 + (P_0 V_q)^2 c_\Psi^4$
Proper time	$d\tau = \frac{dt}{\gamma}$	$d\tau = \frac{dt}{\gamma_\Psi}$
Longitudinal contraction	$L_{\parallel} = L_0 / \gamma$	$L_{\parallel} = L_0 / \gamma_\Psi$
Gravity	curvature of spacetime	gradient of the pressure index $n_\Psi(\mathbf{x})$
Radiation	electromagnetic waves	pressure waves of the Ψ field
Inertia	intrinsic property of mass	volumetric reaction of the compressed ether

10 Conceptual Synthesis

Einstein's relativity and the quarkic-ether relativity **use the same formal equations**, but rest on fundamentally different foundations:

1. **Einstein:** spacetime is a geometry without material support; its curvature dictates motion.
2. **QuarkBase:** the universe is a continuum of perfect pressure; its redistribution dictates motion.

At the limiting velocity c_Ψ , the ether behaves as a non-deformable medium; the effective metric of the Ψ field becomes identical to the Minkowski metric. The transformations, relativistic effects, and gravitation are **mathematical emergences of a single physical phenomenon: the finite propagation of pressures in a frictionless medium**.

11 Experimental Mini-Appendix

Equivalent Measurable Predictions in the Quarkic Regime

1. Pressure Delay (Etheric Shapiro Effect)

$$\Delta t \simeq \frac{\xi}{c_\Psi} \int \Phi_\Psi(\mathbf{x}) dl.$$

Measurable with coherent pressure interferometers (SEP-V1).

2. Deflection of Pressure Waves

$$\hat{\alpha} \simeq \xi \int \nabla_\perp \Phi_\Psi(\mathbf{x}) dl.$$

Analogous to gravitational light deflection, observable in etheric chambers with coherent sources.

3. Frequency Shift Due to Pressure Gradient

$$\frac{\Delta\omega}{\omega} \simeq \xi [\Phi_\Psi(\text{emitter}) - \Phi_\Psi(\text{detector})].$$

Equivalent to gravitational redshift, detectable through phase variations in the Ψ field.

4. Cosmological Temporal Redshift

$$1 + z = \frac{n_\Psi(t_{\text{obs}})}{n_\Psi(t_{\text{em}})}.$$

Reproduces the observed cosmic redshifts without invoking metric expansion.

12 Conclusion

The so-called “curvature of spacetime” and relativistic limits can be understood as manifestations of a single underlying principle:

The delayed volumetric displacement of the quarkic plasma ether — a perfect, frictionless medium that defines the structure of the universe.

Thus, relativity does not vanish: **it is born from the ether**. Einstein’s geometric framework turns out to be the mathematical shadow of a deeper physical process: the pressure dynamics of the Ψ field — the true continuous fabric of the cosmos.

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